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TITLE: TERMINAL BOARD, POWER LINE CARRIER COMMUNICATION EQUIPMENT AND POWER LINE CARRIER ILUMINATION CONTROLLER

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ABSTRACT:

PURPOSE: To suppress the attenuation of a transmission signal by connecting a controlled system load to a power input terminal to which an impedance upper is interposed and connecting a power line carrier terminal to a terminal to which no impedance upper is interposed.

CONSTITUTION: This terminal board 10 is arranged in an illuminator main body 14 by holding an illumination load 4 with an electronic stabilizer 2 and the power line carrier terminal 3, and packaged on a ceiling 13 face. The impedance upper 12 consisting of an L and a C is connected to the

power input
terminal 11a in the terminal board 10. The electronic stabilizer 2 is provided
with a filter circuit 6, however, its impedance in the frequency component of
the transmission signal observed from a power line 1 side is kept higher by the
impedance upper 12. Therefore, the transmission signal can be transmitted
without generating the attenuation to a power line carrier terminal 3 side, and
only a transmission signal component is detected by a reception circuit 8 via a
coupling circuit 9, and supplied to the operation control of an inverter
lightening circuit 5.

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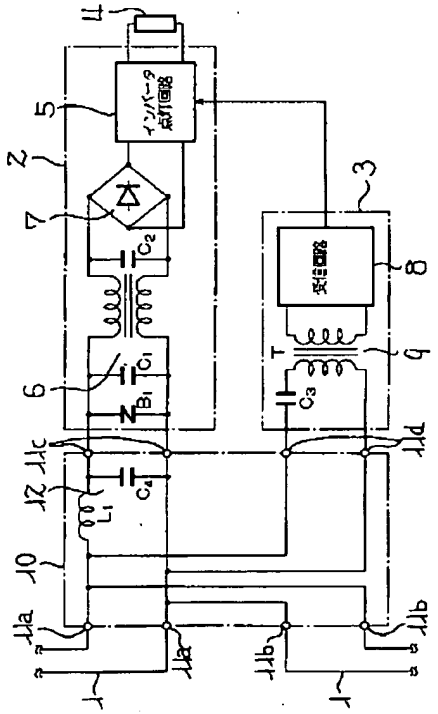
(54)【発明の名称】　端子台、電力線搬送通信装置及び電力線搬送照明制御装置

(57)【要約】

【目的】　電力線搬送通信による伝送信号送出による遠隔制御システムを構築する上で、伝送信号の周波数成分に対してインピーダンス低下を伴い得る制御負荷対象等に改良・変更を要せず、伝送信号の減衰を抑制できるようにすること。

【構成】　電力入力端子１１ａと、この電力入力端子１１ａに接続されて電力入力端子側からみた伝送信号の周波数成分のインピーダンスを高くするためのインピーダンスアッパ１２と、このインピーダンスアッパ１２を介して電力入力端子１１ａに接続された第１端子１１ｃと、電力入力端子１１ａに直接接続された第２端子１１ｄとを備えた電力線搬送通信用の端子台１２とすることにより、第１端子１１ｃ側に伝送信号の周波数成分でインピーダンスアッパ低下を招く制御対象負荷２を接続し、第２端子１１ｄ側に電力線搬送端末器３を接続するだけで、伝送信号の減衰を抑制できるようにした。



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【特許請求の範囲】

【請求項1】　電力入力端子と、この電力入力端子に接続されて電力入力端子側からみた伝送信号の周波数成分のインピーダンスを高くするためのインピーダンスアッパと、このインピーダンスアッパを介して前記電力入力端子に接続された第1端子と、前記電力入力端子に直接接続された第2端子とを備えてなることを特徴とする電力線搬送通信用の端子台。

【請求項2】　伝送信号が重畳される電力線に電力入力端子が接続される請求項1記載の端子台と、この端子台の第1端子に接続されたインピーダンス低下を招く制御対象負荷と、前記端子台の第2端子に接続されて前記制御対象負荷を制御するための電力線搬送端末器とを備えてなることを特徴とする電力線搬送通信装置。

【請求項3】　伝送信号が重畳される電力線に電力入力端子が接続される請求項1記載の端子台と、フィルタ回路を有してこの端子台の第1端子に接続された電子安定器と、前記端子台の第2端子に接続されて前記電子安定器を制御するための受信回路を含む電力線搬送端末器とを備えてなることを特徴とする電力線搬送照明制御装置。

【請求項4】　端子台中のインピーダンスアッパが、LC共振回路よりなることを特徴とする請求項3記載の電力線搬送照明制御装置。

【請求項5】　入力段にフィルタ回路を有する電子安定器と、前記フィルタ回路に直列接続された結合回路を入力段に有する電力線搬送端末器とを備えてなることを特徴とする電力線搬送照明制御装置。

【請求項6】　フィルタ回路中のコンデンサと結合回路中の結合トランスのインダクタンスとによるLCフィルタによりインピーダンスアッパを形成したことを特徴とする請求項5記載の電力線搬送照明制御装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、電力線を信号伝送路として制御対象物を遠隔制御するシステムに適した端子台、電力線搬送通信装置及び電力線搬送照明制御装置に関する。

【0002】

【従来の技術】従来、照明制御システムとしては、電力線搬送通信を利用した遠隔制御システムがある。図5はその概要を示し、商用の電力線1に対して複数の電子安定器（インバータ点灯装置）2が並列に接続され、これらの電子安定器2に並列に電力線搬送端末器3が接続されている。そして、電力線1に接続された制御盤（図示せず）から点灯／消灯信号或いは調光信号なる伝送信号を発して、電力線1上を重畳させて伝送し、この伝送信号を電力線搬送端末器3において受信検出し、対応する電子安定器2に動作制御信号を与えることで、その電子安定器2に接続されている放電灯等の照明負荷4の点灯

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状態を遠隔制御するものである。

【0003】図6に、例えば、1つの電子安定器2と電力線搬送端末器3との組を抽出して示す。まず、電子安定器2は高周波発振動作を行なうインバータ点灯回路5を主体とするもので、その電力入力部には雑音電圧を減少させる等の目的からフィルタ回路6が設けられており、コンデンサC_1，C_2やバリスタB_1を有する構成とされている。7はインバータ点灯回路5に直流電圧を供給する全波整流回路である。一方、電力線搬送端末器3は、伝送信号を受信検出して前記インバータ点灯回路5に動作制御信号を出力する受信回路8を主体とするもので、その入力段には電力線1上から電源電圧を除去し伝送信号を取り出すための結合回路9が設けられており、直流カット用のコンデンサC_3と結合トランスTとを有する構成とされている。

【0004】図6に示すような構成において、電力線搬送通信によってインバータ点灯回路5（照明負荷4）を遠隔制御しようとする場合、電力線1に接続されたフィルタ回路6中のコンデンサC_1，C_2やバリスタB_1の容量により、伝送信号の周波数成分（例えば、125kHz）の線路インピーダンスが低下してしまう。この結果、電力線搬送端末器3側に搬送されるべき伝送信号の減衰量が増加し、伝送誤りを発生するおそれがあり、遠隔制御を正常に行なえないケースを生ずる。

【0005】そこで、特公平3－79917号公報によれば、線路インピーダンスの低下を招く被制御機器（上例であれば、電子安定器に相当する）と電力線との間に、LC並列共振回路よりなるインピーダンスアッパを介在させることで、伝送信号の減衰を抑えるようにした点が示されている。インダクタは高周波になる程インピーダンスが高くなるため、被制御機器側の伝送信号に対するインピーダンス低下が防止される。ここに、LC並列共振回路は伝送信号の周波数（例えば、125kHz）に共振するように設定されており、インダクタ1個によりインピーダンスアッパを形成する場合よりもインピーダンスを高くし得るとともに、負荷の影響を受けにくい利点を持つ。

【0006】

【発明が解決しようとする課題】ところが、この特公平3－79917号公報によれば、インピーダンスアッパが送受信装置に内蔵されている。これは、図6に示した例で考えれば、電子安定器2に対して電力線搬送端末器3とインピーダンスアッパとが一体で組み込まれて実装された電力線搬送通信用の専用品構造に相当する。つまり、既存の電子安定器をそのまま用いることはできず、インピーダンスアッパ等を一体化した専用品を用意し、又は、変更しなければならない。よって、電力線搬送通信システムを構築する場合、コスト高となる。

【0007】

【課題を解決するための手段】請求項1記載の発明で

は、電力入力端子と、この電力入力端子に接続されて電力入力端子側からみた伝送信号の周波数成分のインピーダンスを高くするためのインピーダンスアッパと、このインピーダンスアッパを介して前記電力入力端子に接続された第１端子と、前記電力入力端子に直接接続された第２端子とを備えた電力線搬送通信用の端子台を構成した。

【０００８】請求項２記載の発明では、伝送信号が重畳される電力線に電力入力端子が接続される請求項１記載の端子台と、この端子台の第１端子に接続されたインピーダンス低下を招く制御対象負荷と、前記端子台の第２端子に接続されて前記制御対象負荷を制御するための電力線搬送端末器とを備えた電力線搬送通信装置を構成した。

【０００９】請求項３記載の発明では、伝送信号が重畳される電力線に電力入力端子が接続される請求項１記載の端子台と、フィルタ回路を有してこの端子台の第１端子に接続された電子安定器と、前記端子台の第２端子に接続されて前記電子安定器を制御するための受信回路を含む電力線搬送端末器とを備えた電力線搬送照明制御装置を構成した。

【００１０】請求項４記載の発明では、請求項３記載の電力線搬送照明制御装置中のインピーダンスアッパを、ＬＣ共振回路により形成した。

【００１１】請求項５記載の発明では、入力段にフィルタ回路を有する電子安定器と、前記フィルタ回路に直列接続された結合回路を入力段に有する電力線搬送端末器とを備えた電力線搬送照明制御装置を構成した。

【００１２】請求項６記載の発明では、請求項５記載の電力線搬送照明制御装置において、フィルタ回路中のコンデンサと結合回路中の結合トランスのインダクタンスとによるＬＣフィルタによりインピーダンスアッパを形成した。

【００１３】

【作用】請求項１記載の発明の電力線搬送通信用の端子台においては、電力入力端子に対してインピーダンスアッパを介在させた第１端子とインピーダンスアッパを介在させない第２端子とを有するので、第１端子側に伝送信号の周波数成分でインピーダンスアッパ低下を招く制御対象負荷を接続し、第２端子側に電力線搬送端末器を接続することにより、伝送信号の減衰を抑制できる電力線搬送通信システムを構築できる。即ち、端子台を変更するだけで、制御対象負荷等には変更を要せず、既存の汎用品を用いることができる。

【００１４】よって、請求項２記載の発明の電力線搬送通信装置においては、制御対象負荷や電力線搬送端末には一切変更を要せず、既存の汎用品を用いながら伝送信号の減衰を抑制できる。

【００１５】より具体的に、請求項３記載の発明の電力線搬送照明制御装置においては、照明負荷を点灯させるための電子安定器やこの電子安定器を制御するための電力線搬送端末器には一切変更を要せず、既存の汎用品を用いながら、伝送信号の減衰を抑制して照明負荷を適正に遠隔制御できる。

【００１６】この場合、請求項４記載の発明の電力線搬送照明制御装置においては、端子台中のインピーダンスアッパをＬＣ共振回路により形成しているので、調光信号等の伝送信号の周波数に対して効果的にインピーダンスを増加させることができ、安定した照明制御を行なえる。

【００１７】一方、請求項５記載の発明の電力線搬送照明制御装置においては、電子安定器の入力段のフィルタ回路と、電力線搬送端末器の入力段の結合回路とを直列接続しているので、この直列接続だけで実質的にインピーダンスアッパを形成でき、電子安定器や電力線搬送端末器には特別な追加・変更を要せず、既存の汎用品を用いながら、伝送信号の減衰を抑制して照明負荷を適正に遠隔制御できる。

【００１８】より具体的に、請求項６記載の発明の電力線搬送照明制御装置においては、フィルタ回路と結合回路とを直列接続するだけで、フィルタ回路中のコンデンサと結合回路中の結合トランスのインダクタンスとによるＬＣフィルタによりインピーダンスアッパを形成しているので、電子安定器や電力線搬送端末器、さらには、端子台にも特別な追加・変更を要せず、既存の汎用品を用いながら、伝送信号の減衰を抑制して照明負荷を適正に遠隔制御できる。

【００１９】

【実施例】本発明の第一の実施例を図１ないし図３に基づいて説明する。図５及び図６で示した部分と同一部分は同一符号を用いて示し、その詳細は省略する（次の実施例でも同様とする）。本実施例は、図５に示したような電力線搬送通信を利用して照明負荷４を遠隔制御する電力線搬送照明制御装置に適用したもので、図６との対比では、電力線１と、電子安定器２及び電力線搬送端末器３との間に、端子台１０が介在されている。この端子台１０には、図１に示すように、電力線１から電力を取り込むための電力入力端子１１ａと、電力線１自身を他部に送るための送り出し端子１１ｂとが設けられている。また、端子台１０内において、前記電力入力端子１１ａにはインピーダンスアッパ１２が接続されている。このインピーダンスアッパ１２はインダクタL_1とコンデンサC_4とのＬＣ共振回路として形成されており、電力入力端子１１ａ（電力線１）側からみた伝送信号の周波数成分（例えば、１２５ｋＨｚ）に対してのみインピーダンスを増加させるように定数が設定されている。このインピーダンスアッパ１２の出力側（コンデンサC_4の両端）からは、第１端子１１ｃが引き出されている。また、この第１端子１１ｃとは別の第２端子１１ｄが前記電力入力端子１１ａから直接引き出されている。前記

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第1端子１１ｃには前記電子安定器２が接続され、前記第２端子１１ｄには前記電力線搬送端末器３が接続されている。

【００２０】図２に、このような端子台１０における端子１１ａ～１１ｄの配置例の外観を概略的に示す。なお、各端子１１ａ～１１ｄに関して３個ずつ図示するが、１つは各々アース端子である。

【００２１】また、図１に示したような電力線搬送照明制御装置の天井１３面への実装例の概要を図３に示す。端子台１０は電子安定器２や電力線搬送端末器３とともに、照明負荷４を保持して天井１３面に取り付けられる照明器具本体１４内に配設されて天井１３面に実装される。

【００２２】このような構成において、５０／６０Ｈｚなる電源周波数の電力が電力線１上を供給される。同時に、制御盤から点灯／消灯信号或いは調光信号なる伝送信号を例えば１２５ｋＨｚの周波数成分を持たせて発し、電力線１上に重畳させて伝送させる。電力線１上を伝送される伝送信号を結合回路９を介して受信回路８で受信検出し、その伝送信号に応じた動作制御信号をインバータ点灯回路５に与えることにより、照明負荷４の点灯状態（点灯／消灯或いは調光）が制御される。

【００２３】このような動作において、コンデンサC_4のインピーダンスをZ_C、インダクタL_1のインピーダンスをZ_Lとすると、電源周波数成分においては$Z_C \gg Z_L$となり、伝送信号の周波数成分においては逆に$Z_C \ll Z_L$となる。よって、電子安定器２においてその入力段に伝送信号の周波数成分でインピーダンス低下を招くフィルタ回路６を有するが、電力線１側からみた伝送信号の周波数成分でのインピーダンスがインピーダンスアッパ１２によって高く維持される。この結果、伝送信号は減衰することなく、電力線搬送端末器３側に伝送され、その伝送信号成分のみが結合回路９を介して受信回路８で受信検出され、インバータ点灯回路５の動作制御に供される。

【００２４】本実施例によれば、インピーダンスアッパ１２を内蔵した端子台１０を用いるだけで、既存の電子安定器２や電力線搬送端末器３には一切改良・変更を要せず、汎用性が高くて安価な装置構成で済むことになる。また、インピーダンスアッパ１２がＬＣ共振回路として形成されているので、伝送信号の周波数成分に対してのみ確実にインピーダンスを高めることができ、遠隔制御による照明制御を確実に行なうことができる。

【００２５】なお、本実施例では、端子台１０の第１端子１１ｃに電子安定器２を接続し、第２端子１１ｄに電力線搬送端末器３を接続した電力線搬送照明制御装置への適用例で説明したが、一般論として、端子台１０の第１端子１１ｃに伝送信号の周波数成分に対してインピーダンス低下を招く制御対象負荷を接続し、端子台１０の第２端子１１ｄにはこの制御対象負荷を制御するための

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電力線搬送端末器を接続してなる電力線搬送通信装置に適用し得ることは容易に理解できる。例えば、照明の遠隔制御に限らず、エアコンの遠隔制御等に適用し得る。

【００２６】つづいて、本発明の第二の実施例を図４に基づいて説明する。本実施例も、図５に示したような電力線搬送通信を利用して照明負荷４を遠隔制御する電力線搬送照明制御装置に適用したもので、結合回路９中のコンデンサC_3が省略され、電子安定器２のフィルタ回路６と電力線搬送端末器３の結合回路９とが直列に接続されている。より詳細には、フィルタ回路６中のコンデンサC_1と結合回路９中の結合トランスＴの１次巻線N_1とが直列に接続され、このコンデンサC_1と１次巻線N_1との直列回路の両端が電力線１に接続されている。これらのコンデンサC_1と１次巻線N_1のインダクタンス成分とはインピーダンスアッパ１５となるＬＣフィルタを形成している。また、本実施例の端子台１６としては、電力入力端子１７ａ、送り出し端子１７ｂとともに、第１，２端子１７ｃ，１７ｄが用意され、第１，２端子１７ｃ，１７ｄの片側同士は短絡されて直列状態とされている。もっとも、この短絡部分に関して、コンデンサC_1と１次巻線N_1とで直に直結されている場合には、第１，２端子１７ｃ，１７ｄの外側端子部分のみ設けたものでもよい。

【００２７】このような構成において、低周波数成分に対して高いインピーダンスを示す電子安定器２のコンデンサC_1には電源周波数成分の電源電圧のみかかり、全波整流回路７等を介してインバータ点灯回路５に電力が供給される。一方、高周波成分に対して高いインピーダンスを示す結合トランスＴには電力線１上を伝送される高周波の伝送信号成分のみがかかり、受信回路８により受信検出される。このような動作において、電力線１から負荷側をみたインピーダンスは、コンデンサC_1と１次巻線N_1のインダクタンス成分との直列接続によるＬＣフィルタ分であり、そのインダクタンス成分により伝送信号の周波数成分に対してインピーダンスアッパ１５となっており、伝送信号の減衰を生じない。

【００２８】本実施例によれば、電力線搬送端末器３中のコンデンサC_3を省略して、電子安定器２の入力段と電力線搬送端末器３の入力段とを接続するだけで、伝送信号の減衰のない遠隔制御機能を実現できるので、実質的に、既存の電子安定器２や電力線搬送端末器３に部品追加等の改良・変更を要せず、汎用性が高くて安価な装置構成で済むことになる。さらには、端子台１６に関しても、インピーダンスアッパ等を内蔵させる必要なく、既存の端子台を用いることもできる。

【００２９】

【発明の効果】請求項１記載の発明によれば、電力入力端子と、この電力入力端子に接続されて電力入力端子側からみた伝送信号の周波数成分のインピーダンスを高くするためのインピーダンスアッパと、このインピーダン

スアッパを介して前記電力入力端子に接続された第１端子と、前記電力入力端子に直接接続された第２端子とを備えた電力線搬送通信用の端子台を構成したので、第１端子側に伝送信号の周波数成分でインピーダンスアッパ低下を招く制御対象負荷を接続し、第２端子側に電力線搬送端末器を接続するだけで、伝送信号の減衰を抑制できる電力線搬送通信システムを構築でき、よって、端子台を変更するだけで、制御対象負荷等には変更を要せず、既存の汎用品を用いることができる。

【００３０】請求項２記載の発明によれば、請求項１記載の発明の適用例として、伝送信号が重畳される電力線に電力入力端子が接続される請求項１記載の端子台と、この端子台の第１端子に接続されたインピーダンス低下を招く制御対象負荷と、前記端子台の第２端子に接続されて前記制御対象負荷を制御するための電力線搬送端末器とを備えた電力線搬送通信装置を構成したので、制御対象負荷や電力線搬送端末には一切変更を要せず、既存の汎用品を用いながら伝送信号の減衰を抑制できる電力線搬送通信装置を提供できる。

【００３１】請求項３記載の発明によれば、請求項１記載の発明のより具体的な適用例として、伝送信号が重畳される電力線に電力入力端子が接続される請求項１記載の端子台と、フィルタ回路を有してこの端子台の第１端子に接続された電子安定器と、前記端子台の第２端子に接続されて前記電子安定器を制御するための受信回路を含む電力線搬送端末器とを備えた電力線搬送照明制御装置を構成したので、照明負荷を点灯させるための電子安定器やこの電子安定器を制御するための電力線搬送端末器には一切変更を要せず、既存の汎用品を用いながら、伝送信号の減衰を抑制して照明負荷を適正に遠隔制御することができる。

【００３２】請求項４記載の発明によれば、請求項３記載の電力線搬送照明制御装置中のインピーダンスアッパを、ＬＣ共振回路により形成したので、請求項３記載の発明の効果に加えて、調光信号等の伝送信号の周波数に対して効果的にインピーダンスを増加させることができ、安定した照明制御を行わせることができる。

【００３３】一方、請求項５記載の発明によれば、入力段にフィルタ回路を有する電子安定器と、前記フィルタ

回路に直列接続された結合回路を入力段に有する電力線搬送端末器とを備えた電力線搬送照明制御装置を構成したので、この直列接続だけで実質的にインピーダンスアッパを形成でき、電子安定器や電力線搬送端末器には改良・変更を要せず、既存の汎用品を用いながら、伝送信号の減衰を抑制して照明負荷を適正に遠隔制御することができる。

【００３４】請求項６記載の発明によれば、請求項５記載の電力線搬送照明制御装置において、フィルタ回路中のコンデンサと結合回路中の結合トランスのインダクタンスとによるＬＣフィルタによりインピーダンスアッパを形成したので、電子安定器や電力線搬送端末器、さらには、端子台にも追加・変更を要せず、既存の汎用品を用いながら、伝送信号の減衰を抑制して照明負荷を適正に遠隔制御することができる。

【図面の簡単な説明】

【図１】本発明の第一の実施例の概要を示す回路構成図である。

【図２】端子台の端子配置例の外観を示す斜視図である。

【図３】実装構造の概要を示す正面図である。

【図４】本発明の第二の実施例の概要を示す回路構成図である。

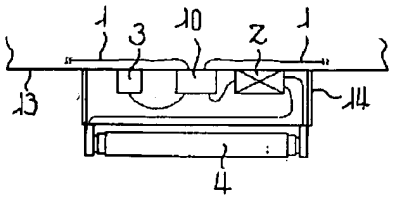
【図５】従来の照明制御システムの構成例を示す配線図である。

【図６】その一部の具体的構成例の概要を示す回路構成図である。

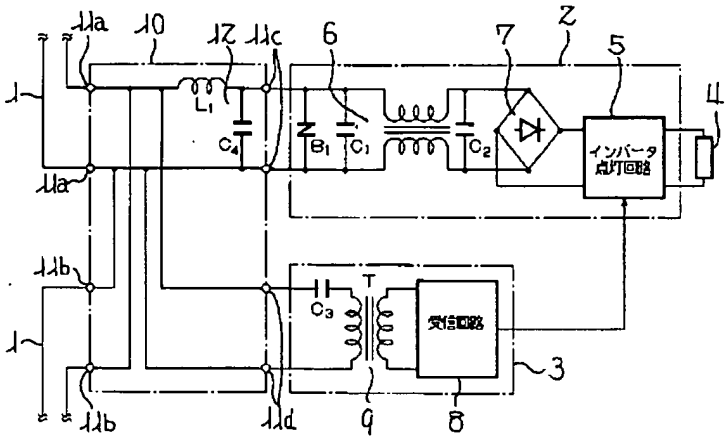
【符号の説明】

１	電力線
２	電子安定器（制御対象負荷）
３	電力線搬送端末器
６	フィルタ回路
８	受信回路
９	結合回路
１０	端子台
１１ａ	電力入力端子
１１ｃ	第１端子
１１ｄ	第２端子
１２，１５	インピーダンスアッパ

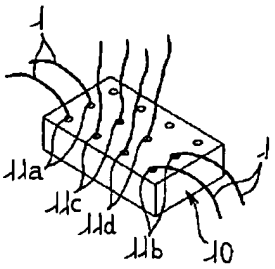
【図３】



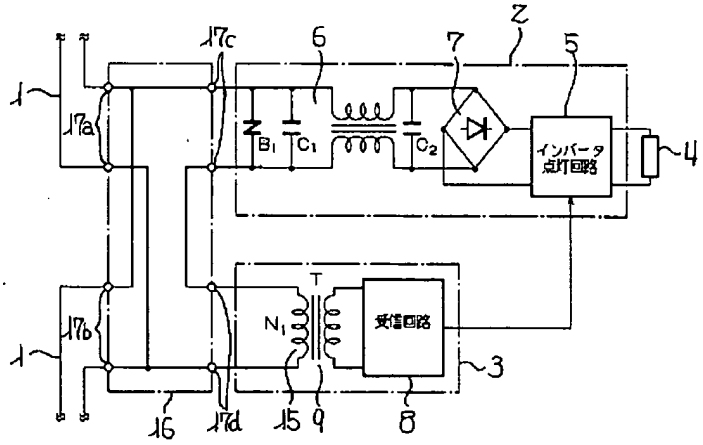
【図1】


11a
10
12
11c
6
7
2
5
4
1
L1
C4
B1
C1
C2
インバータ点灯回路
11a
11b
T
C3
受信回路
3
1
11b
11d
9
8

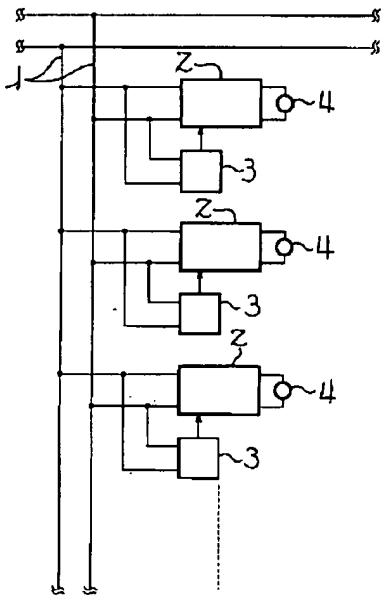
【図2】


1
11a
11c
11d
11b
10
1

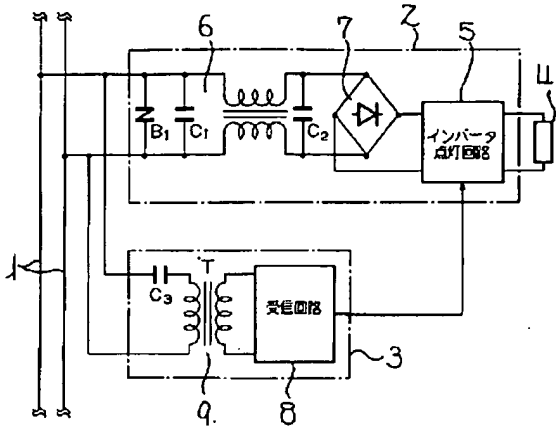
【図4】


17c
6
7
2
5
1
17a
B1
C1
C2
インバータ点灯回路
4
T
N1
受信回路
17b
1
3
16
17d
15
9
8

【図5】


1
2
4
3
2
4
3
2
4
3

【図6】



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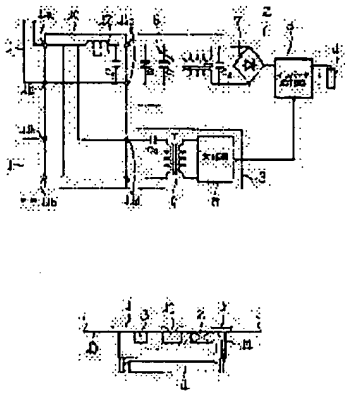
(54) TERMINAL BOARD, POWER LINE CARRIER COMMUNICATION EQUIPMENT AND POWER LINE CARRIER ILUMINATION CONTROLLER

(57)Abstract:
PURPOSE: To suppress the attenuation of a transmission signal by connecting a controlled system load to a power input terminal to which an impedance upper is interposed and connecting a power line carrier terminal to a terminal to which no impedance upper is interposed.
CONSTITUTION: This terminal board 10 is arranged in an illuminator main body 14 by holding an illumination load 4 with an electronic stabilizer 2 and the power line carrier terminal 3, and packaged on a ceiling 13 face. The impedance upper 12 consisting of an L and a C is connected to the power input terminal 11a in the terminal board 10. The electronic stabilizer 2 is provided with a filter circuit 6, however, its impedance in the frequency component of the transmission signal observed from a power line 1 side is kept higher by the impedance upper 12. Therefore, the transmission signal can be transmitted without generating the attenuation to a power line carrier terminal 3 side, and only a transmission signal component is detected by a reception circuit 8 via a coupling circuit 9, and supplied to the operation control of an inverter lightening circuit 5.



LEGAL STATUS

[Date of request for examination]

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[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

CLAIMS

[Claim(s)]
[Claim 1] The terminal block for power line carrier communication characterized by coming to have the 1st terminal connected to said power-input terminal through the impedance upper and this impedance upper for making high the impedance of the frequency component of the transmission signal which connected with a power-input terminal and this power-input terminal, and was seen from the power-input terminal side, and the 2nd terminal by which direct continuation was carried out to said power-input terminal.
[Claim 2] Power line carrier communication equipment characterized by coming to have the terminal block according to claim 1 by which a power-input terminal is connected to the power line with which it is superimposed on a transmission signal, the controlled-system load which causes the impedance fall connected to the 1st terminal of this terminal block, and a power-line-carrier terminal machine for connecting with the 2nd terminal of said terminal block, and controlling said controlled-system load.
[Claim 3] The power-line-carrier lighting control unit characterized by coming to have the terminal block according to claim 1 by which a power-input terminal is connected to the power line with which it is superimposed on a transmission signal, the electronic ballast which has a filter circuit and was connected to the 1st terminal of this terminal block, and a power-line-carrier terminal machine including the receiving circuit for connecting with the 2nd terminal of said terminal block, and controlling said electronic ballast.
[Claim 4] The power-line-carrier lighting control unit according to claim 3 with which the impedance upper of terminal Taizhoug is characterized by consisting of an LC resonance circuit.
[Claim 5] The power-line-carrier lighting control unit characterized by coming to have the electronic ballast which has a filter circuit in an input stage, and the power-line-carrier terminal machine which has the coupled circuit by which series connection was carried out to said filter circuit in an input stage.
[Claim 6] The power-line-carrier lighting control unit according to claim 5 characterized by forming an impedance upper by the LC filter by the capacitor in a filter circuit, and the inductance of the joint transformer in a coupled circuit.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the terminal block, the power line carrier communication equipment, and the power-line-carrier lighting control unit suitable for the system which carries out remote control of the controlled-system object by making the power line into a signal-transmission way.
[0002]
[Description of the Prior Art] Conventionally, as a lighting control system, there is Remote Control System using power line carrier communication. Drawing 5 shows the outline, two or more electronic ballasts (inverter lighting device) 2 are connected to juxtaposition to the commercial power line 1, and the power-line-carrier terminal machine 3 is connected to such electronic ballasts 2 at juxtaposition. and lighting/putting-out-lights signal from the control panel (not shown) connected to the power line 1 or modulated light -- a signal -- a transmission signal is emitted, and a power-line 1 top is made to superimpose, it transmits, and remote control of the lighting condition of the lighting loads 4, such as a electric-discharge lamp connected to that electronic ballast 2, carries out by carrying out reception detection of this transmission signal in the power-line-carrier terminal machine 3, and giving a control signal of operation to the corresponding electronic ballast 2.
[0003] The group of one electronic ballast 2 and power-line-carrier terminal machine 3 is extracted and shown in drawing 6 . First, the inverter lighting circuit 5 which performs high frequency oscillation actuation is made into a subject, the filter circuit 6 is established in the power-input section from the purpose of decreasing noise voltage, and electronic ballast 2 is a capacitor C1 and C2. Varistor B1 It considers as the configuration which it has. 7 is a full wave rectifier circuit which supplies direct current voltage to the inverter lighting circuit 5. On the other hand, the coupled circuit 9 for making into a subject the receiving circuit 8 which carries out reception detection of the transmission signal, and outputs a control signal of operation to said inverter lighting circuit 5, removing supply voltage from on the power line 1 in the input stage, and taking out a transmission signal is formed, and the power-line-carrier terminal machine 3 is the capacitor C3 for a direct-current cut. It considers as the configuration which has the joint transformer T.
[0004] The capacitor C1 in the filter circuit 6 connected to the power line 1 in the configuration as shown in drawing 6 when it was going to carry out remote control of the inverter lighting circuit 5 (lighting load 4) by power line carrier communication, and C2 Varistor B1 With capacity, the line impedance of the frequency component (for example, 125kHz) of a transmission signal will fall. Consequently, the magnitude of attenuation of the transmission signal which should be conveyed at the power-line-carrier terminal machine 3 side increases, there is a possibility of generating a transmission error, and the case where remote control cannot be performed normally is produced.
[0005] Then, according to JP,3-79917,B, the point of having suppressed attenuation of a transmission signal is shown according to making the impedance upper which consists of an LC parallel resonant circuit intervene between the control equipments-ed (for it to be equivalent to electronic ballast, if it is the upper example) and the power lines which cause the fall of a line impedance. Since an impedance becomes high so that an inductor becomes a RF, the impedance fall to the transmission signal by the side of a control equipment-ed is prevented. LC parallel resonant circuit is set up so that it may resonate in the frequency (for example, 125kHz) of a transmission signal, and it has the advantage which cannot be easily influenced of a load here while it can make an impedance higher than the case where an impedance upper is formed by one inductor.
[0006]
[Problem(s) to be Solved by the Invention] However, according to this JP,3-79917,B, the impedance upper is built in the transmitter-receiver. This is equivalent to the exclusive elegance structure for power line carrier communication where the power-line-carrier terminal machine 3 and the impedance upper were incorporated and mounted by one to electronic ballast 2, if it thinks in the example shown in drawing 6 . That is, the existing electronic ballast cannot be used as it is, but the exclusive elegance which unified the impedance upper etc. must be prepared or changed. Therefore, it becomes cost quantity when building a power-line-carrier-communication system.
[0007]
[Means for Solving the Problem] The terminal block equipped with the 1st terminal connected to said power-input terminal through the impedance upper and this impedance upper for making high the impedance of the frequency component of the transmission signal which connected with a power-input terminal and this power-input terminal, and was seen from the power-input terminal side, and the 2nd terminal by which direct continuation was carried out to said power-input terminal for power line carrier communication consisted of invention according to claim 1.

[0008] The power line carrier communication equipment equipped with the terminal block according to claim 1 by which a power-input terminal is connected to the power line with which it is superimposed on a transmission signal, the controlled-system load which causes the impedance fall connected to the 1st terminal of this terminal block, and the power-line-carrier terminal machine for connecting with the 2nd terminal of said terminal block, and controlling said controlled-system load consisted of invention according to claim 2.
[0009] The power-line-carrier lighting control unit equipped with the terminal block according to claim 1 by which a power-input terminal is connected to the power line with which it is superimposed on a transmission signal, the electronic ballast which has a filter circuit and was connected to the 1st terminal of this terminal block, and a power-line-carrier terminal machine including the receiving circuit for connecting with the 2nd terminal of said terminal block, and controlling said electronic ballast consisted of invention according to claim 3.
[0010] In invention according to claim 4, the impedance upper in a power-line-carrier lighting control unit according to claim 3 was formed by LC resonance circuit.
[0011] The power-line-carrier lighting control unit equipped with the electronic ballast which has a filter circuit in an input stage, and the power-line-carrier terminal machine which has the coupled circuit by which series connection was carried out to said filter circuit in an input stage consisted of invention according to claim 5.
[0012] In invention according to claim 6, the impedance upper was formed in the power-line-carrier lighting control device according to claim 5 by the LC filter by the capacitor in a filter circuit, and the inductance of the joint transformer in a coupled circuit.
[0013]
[Function] In the terminal block for the power line carrier communication of invention according to claim 1, since it has the 1st terminal between which the impedance upper was made to be placed to a power-input terminal, and the 2nd terminal between which an impedance upper is not made to be placed, the power-line-carrier-communication system which can control attenuation of a transmission signal can be built by connecting the controlled-system load which invites an impedance upper fall to the 1st terminal side by the frequency component of a transmission signal, and connecting a power-line-carrier terminal machine to the 2nd terminal side. That is, only by changing a terminal block, a controlled-system load cannot take modification but the existing general-purpose article can be used.
[0014] Therefore, in the power line carrier communication equipment of invention according to claim 2, a controlled-system load and a power-line-carrier terminal take no modification, but attenuation of a transmission signal can be controlled, using the existing general-purpose article.
[0015] The power-line-carrier terminal machine for controlling the electronic ballast and this electronic ballast for making a lighting load turn on more concretely in the power-line-carrier lighting control unit of invention according to claim 3 taking no modification, but using the existing general-purpose article, attenuation of a transmission signal is controlled and remote control of the lighting load can be carried out proper.
[0016] In this case, in the power-line-carrier lighting control unit of invention according to claim 4, since the impedance upper of terminal Taizhoug is formed by LC resonance circuit, an impedance can be made to increase effectively to the frequency of transmission signals, such as a modulated light signal, and stable lighting control can be performed.
[0017] On the other hand, being able to form an impedance upper substantially only by this series connection, and not requiring an addition and modification special to electronic ballast or a power-line-carrier terminal machine, but using the existing general-purpose article in the power-line-carrier lighting control unit of invention according to claim 5, since series connection of the filter circuit of the input stage of electronic ballast and the coupled circuit of the input stage of a power-line-carrier terminal machine is carried out, attenuation of a transmission signal is controlled and remote control of the lighting load can be carried out proper.
[0018] Not requiring electronic ballast, a power-line-carrier terminal machine, and an addition and modification still more nearly special to a terminal block, but using the existing general-purpose article, since the series connection of a filter circuit and the coupled circuit is only carried out and the impedance upper is more concretely formed in the power-line-carrier lighting control unit of invention according to claim 6 by the LC filter by the capacitor in a filter circuit, and the inductance of the joint transformer in a coupled circuit, attenuation of a transmission signal is controlled and remote control of the lighting load can be carried out proper.
[0019]
[Example] The first example of this invention is explained based on drawing 1 thru/or drawing 3 . The same part as the part shown by drawing 5 and drawing 6 is shown using the same sign, and the detail is omitted (suppose that it is the same also in the following example). This example is what was applied to the power-line-carrier lighting control unit which carries out remote control of the lighting load 4 using power line carrier communication as shown in drawing 5 , and the terminal block 10 intervenes in contrast with drawing 6 between the power line 1, and electronic ballast 2 and the power-line-carrier terminal machine 3. As shown in drawing 1 , power-input terminal 11a for incorporating power from the power line 1 and send terminal 11b for sending power-line 1 self to the other sections are prepared in this terminal block 10. Moreover, the impedance upper 12 is connected to said power-input terminal 11a into the terminal block 10. This impedance upper 12 is an inductor L1. Capacitor C4 It is formed as an LC resonance circuit, and the constant is set up so that an impedance may be made to increase only to the frequency component (for example, 125kHz) of the transmission signal seen from the power-input terminal 11a (power line 1) side. 1st terminal 11c is pulled out from the output side (both ends of a capacitor C4) of this impedance upper 12. Moreover, the direct drawer of the 11d of the 2nd terminal different from this 1st terminal 11c is carried out from said power-input terminal 11a.

Said electronic ballast 2 is connected to said 1st terminal 11c, and said power-line-carrier terminal machine 3 is connected to the 11d of said 2nd terminal.
[0020] The appearance of the terminals [in such a terminal block 10 / 11a-11d] example of arrangement is roughly shown in drawing 2 . In addition, although it illustrates three pieces at a time about each terminals 11a-11d, one is a grounding terminal respectively.
[0021] Moreover, the outline of the page [of head lining of a power-line-carrier lighting control unit as shown in drawing 1 / 13th] example of mounting is shown in drawing 3 . A terminal block 10 is arranged in the body 14 of lighting fitting which holds the lighting load 4 and is attached in the 13th page of head lining with electronic ballast 2 and the power-line-carrier terminal machine 3, and is mounted in the 13th page of head lining.
[0022] In such a configuration, a power-line 1 top is supplied to the power of the power line period which becomes 50/60Hz. coincidence -- lighting/putting-out-lights signal from a control panel, or modulated light -- a signal -- give a 125kHz frequency component, emit a transmission signal, and it is made to superimpose on the power line 1, and is made to transmit The lighting condition (lighting / putting out lights, or modulated light) of the lighting load 4 is controlled by carrying out reception detection of the transmission signal transmitted in a power-line 1 top through a coupled circuit 9 in a receiving circuit 8, and giving the control signal of operation according to the transmission signal to the inverter lighting circuit 5.
[0023] It sets in such actuation and is a capacitor C4. They are ZC and an inductor L1 about an impedance. It is ZL about an impedance. If it carries out, it is set to ZC >>ZL in a power line period component, it sets to the frequency component of a transmission signal, and is ZC <<ZL conversely. It becomes. Therefore, although it has the filter circuit 6 from which an impedance fall is invited to the input stage by the frequency component of a transmission signal in electronic ballast 2, the impedance in the frequency component of the transmission signal seen from the power-line 1 side is highly maintained by the impedance upper 12. Consequently, without decreasing, a transmission signal is transmitted to the power-line-carrier terminal machine 3 side, reception detection only of that transmission signal component is carried out through a coupled circuit 9 in a receiving circuit 8, and the motion control of the inverter lighting circuit 5 is presented with it.
[0024] According to this example, existing electronic ballast 2 and the existing power-line-carrier terminal machine 3 will take no amelioration and modification only by using the terminal block 10 which built in the impedance upper 12, but versatility can be managed with a high and cheap equipment configuration. Moreover, since the impedance upper 12 is formed as an LC resonance circuit, an impedance can be certainly raised only to the frequency component of a transmission signal, and lighting control by remote control can be ensured.
[0025] In addition, although the example of application to the power-line-carrier lighting control unit which connected electronic ballast 2 to 1st terminal 11c of a terminal block 10, and connected the power-line-carrier terminal machine 3 to the 11d of the 2nd terminal explained in this example The controlled-system load which invites an impedance fall to 1st terminal 11c of a terminal block 10 to the frequency component of a transmission signal as a generality is connected. It can be understood easily that it can apply to the power line carrier communication equipment which comes to connect the power-line-carrier terminal machine for controlling this controlled-system load with the 11d of the 2nd terminal of a terminal block 10. For example, it can apply to remote control of not only remote control of lighting but an air-conditioner etc.
[0026] It continues and the second example of this invention is explained based on drawing 4 . It is what was applied to the power-line-carrier lighting control device with which this example also carries out remote control of the lighting load 4 using power line carrier communication as shown in drawing 5 , and is the capacitor C3 in a coupled circuit 9. It is omitted and the filter circuit 6 of electronic ballast 2 and the coupled circuit 9 of the power-line-carrier terminal machine 3 are connected to the serial. In a detail, it is the capacitor C1 in a filter circuit 6 more. Primary coil N1 of the joint transformer T in a coupled circuit 9 It connects with a serial and is this capacitor C1. Primary coil N1 The both ends of a series circuit are connected to the power line 1. These capacitors C1 Primary coil N1 The inductance component forms the LC filter used as the impedance upper 15. Moreover, as a terminal block 16 of this example, with power-input terminal 17a and send terminal 17b, the 1st and 2 terminals 17c and 17d are prepared, one side which are the 1st and 2 terminals 17c and 17d connects too hastily, and they are made into the serial condition. But it is related with this short circuit part, and is a capacitor C1. Primary coil N1 When linked directly soon, what was prepared by the 1st and 2 terminals [17c and 17d] outside terminal area may be used.
[0027] capacitor C1 of the electronic ballast 2 in which a high impedance is shown to a low frequency component in such a configuration **** -- only the supply voltage of a power line period component is built, and power is supplied to the inverter lighting circuit 5 through full-wave-rectifier-circuit 7 grade. On the other hand, the joint transformer T in which a high impedance is shown to a high frequency component costs only the transmission signal component of the RF transmitted in a power-line 1 top, and reception detection is carried out by the receiving circuit 8. The impedance which saw the load side from the power line 1 in such actuation is a capacitor C1. Primary coil N1 It is a part for the LC filter by series connection with an inductance component, and it is the impedance upper 15 to the frequency component of a transmission signal by the inductance component, and attenuation of a transmission signal is not produced.
[0028] According to this example, it is the capacitor C3 in the power-line-carrier terminal machine 3. Since a remote control function without attenuation of a transmission signal is realizable only by omitting and connecting the input stage of electronic ballast 2, and the input stage of the power-line-carrier terminal machine 3, substantially, existing electronic ballast 2 or the existing power-line-carrier terminal machine 3 will not take amelioration and modification of a components addition etc., but versatility can be managed with a high and cheap equipment configuration. Furthermore, it is not necessary to make an impedance upper etc. able to build in, and the existing terminal block can also be used also about a terminal block 16.
[0029]

[Effect of the Invention] The impedance upper for making high the impedance of the frequency component of the transmission signal which connected with a power-input terminal and this power-input terminal, and was seen from the power-input terminal side according to invention according to claim 1, Since the terminal block equipped with the 1st terminal connected to said power-input terminal through this impedance upper and the 2nd terminal by which direct continuation was carried out to said power-input terminal for power line carrier communication was constituted Only by connecting the controlled-system load which invites an impedance upper fall to the 1st terminal side by the frequency component of a transmission signal, and connecting a power-line-carrier terminal machine to the 2nd terminal side The power-line-carrier-communication system which can control attenuation of a transmission signal can be built, therefore, only by changing a terminal block, a controlled-system load cannot take modification but the existing general-purpose article can be used.
[0030] According to invention according to claim 2, as an example of application of invention according to claim 1 The terminal block according to claim 1 by which a power-input terminal is connected to the power line with which it is superimposed on a transmission signal, Since the power line carrier communication equipment equipped with the controlled-system load which causes the impedance fall connected to the 1st terminal of this terminal block, and the power-line-carrier terminal machine for connecting with the 2nd terminal of said terminal block, and controlling said controlled-system load was constituted A controlled-system load and a power-line-carrier terminal take no modification, but the power line carrier communication equipment which can control attenuation of a transmission signal can be offered, using the existing general-purpose article.
[0031] According to invention according to claim 3, as a more concrete example of application of invention according to claim 1 The terminal block according to claim 1 by which a power-input terminal is connected to the power line with which it is superimposed on a transmission signal, The electronic ballast which has a filter circuit and was connected to the 1st terminal of this terminal block, Since the power-line-carrier lighting control unit equipped with the power-line-carrier terminal machine including the receiving circuit for connecting with the 2nd terminal of said terminal block, and controlling said electronic ballast was constituted The power-line-carrier terminal machine for controlling the electronic ballast and this electronic ballast for making a lighting load turn on taking no modification, but using the existing general-purpose article, attenuation of a transmission signal can be controlled and remote control of the lighting load can be carried out proper.
[0032] Since the impedance upper in a power-line-carrier lighting control unit according to claim 3 was formed by LC resonance circuit, an impedance can be made to be able to increase effectively to the frequency of transmission signals, such as a modulated light signal, and the stable lighting control can be made to perform [according to invention according to claim 4] in addition to an effect of the invention according to claim 3.
[0033] Being able to form an impedance upper substantially only by this series connection, and neither electronic ballast nor a power-line-carrier terminal machine taking amelioration and modification, but, using the existing general-purpose article on the other hand, since the power-line-carrier lighting control unit equipped with the electronic ballast which has a filter circuit in an input stage, and the power-line-carrier terminal machine which has the coupled circuit by which series connection was carried out to said filter circuit in an input stage was constituted according to invention according to claim 5, attenuation of a transmission signal can be controlled and remote control of the lighting load can be carried out proper.
[0034] According to invention according to claim 6, in a power-line-carrier lighting control device according to claim 5, since the impedance upper was formed by the LC filter by the capacitor in a filter circuit, and the inductance of the joint transformer in a coupled circuit, a terminal block not taking an addition and modification, either, but using the existing general-purpose article, attenuation of a transmission signal can be controlled to electronic ballast, a power-line-carrier terminal machine, and a pan, and remote control of the lighting load can be carried out to them proper.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the circuitry Fig. showing the outline of the first example of this invention.
[Drawing 2] It is the perspective view showing the appearance of the example of terminal arrangement of a terminal block.
[Drawing 3] It is the front view showing the outline of mounting structure.
[Drawing 4] It is the circuitry Fig. showing the outline of the second example of this invention.
[Drawing 5] It is the plugging chart showing the example of a configuration of the conventional lighting control system.
[Drawing 6] It is the circuitry Fig. showing the outline of some the examples of a concrete configuration.
[Description of Notations]
-1 Power Line
2 Electronic Ballast (Controlled-System Load)
3 Power-Line-Carrier Terminal Machine
6 Filter Circuit
8 Receiving Circuit
9 Coupled Circuit
10 Terminal Block
11a Power-input terminal
11c The 1st terminal
11d The 2nd terminal
12 15 Impedance upper

[Translation done.]